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JOURNAL

OF THE

American Geographical and Statistical SOCIETY.

VOL. I. FEBRUARY, 1859. No. 2.

PROCEEDINGS.

FOURTH MEETING, February 3d, 1859. The President in the chair.

The following named gentlemen were elected members of the Society:

William Caldwell, John C. Henderson, Rev. E. H. Chapin, D. D., John McMullen, *Adam Norrie, *Daniel H. Arnold, *George C. Ward, *Royal Phelps, *Reuben Withers, *James Punnett, *John C. Green, *Auguste Belmont, *Geo. Griswold, *William H. Fogg, *John C. Havemeyer, *Augustus Schell, *John D. Wolfe, *Richard Lathers, J. G. Pearson, Judge Constant, Alfred Pell, Jr., Matthew Morgan, Chas. T. Cromwell.

The special committee appointed at the annual meeting to audit the accounts of the Treasurer, submitted a report which was read, accepted and ordered on file.

The proposition submitted by Dr. Adamson, at the last meeting of the Society, for the election of Missionaries, and Secretaries of Missionary and Religious Societies, as ex-officio Members of the Society, was, on motion of Mr. Lefferts, referred to the Council to inquire and report upon.

Hon. Sylvester Mowry read a paper on the "Geography and Resources of Arizona." A vote of thanks was tendered to Mr. Mowry, and a copy of his paper requested for the Archives of the Society.

Mr. Viele moved that the Special Committee appointed to co-operate with Dr. Hayes for further Arctic Research, be increased from five to fifteen members, to be appointed by the Chair. Adopted.

The President announced to the Society that the New Rooms in Clinton Hall would be inaugurated on Thursday next. A special meeting would be held, and the Library and Collections would be open for examination.

Adjourned.

DEPARTMENT OF GEOGRAPHY.

OROGRAPHY OF THE WESTERN PORTION OF THE CONTINENT OF NORTH AMERICA.*

The American Continent has been divided in the temperate zone into three portions, which correspond to Geographical, as well as Geological divisions:

1st. The Oriental or Atlantic portion bounded by the Valley of the Mississippi on the west.

2d. The Middle portion, embracing the Rocky Mountain region and the basin country lying to the west.

3d. The Pacific or Western portion extending from the lofty mountains west of 116° long. W. to the Pacific shore.

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* Life members.

* "Notes upon the Orography of the Western portion of the Continent of North America. A paper read before the American Geographical and Statistical Society, by THOMAS ANTISELL, M. D., Feb. 19, 1857.

The Geological relations of these sections may be thus indicated:

The 1st embraces the region of primary and silurian rocks;

The 2d embraces the palæozoic strata; and

The 3d " the tertiary strata.

Not that it can be affirmed that any one of these subdivisions contains only one of these classes of rocks, but merely that in those localities the most extensive and best marked deposits thus characterized may be found.

Each of these portions has its surface diversified by long and lofty chains of mountains which run in a direction north and south; those in the western section tending more to the east as they pass southward, while the chains on the east side of the continent tend to the west. Thus a triangular shape is conferred on the continent which forms, as it were, a section of a funnel, with the mouth open to the north, and thus exposed to the passage of the north wind, which, blowing so severely over three-fourths of the continent, as far south as latitude 35°, renders the influence of the south winds, which are laden with warm air and moisture, only manifest during the summer season.

The portion of the continent over which the north wind does not dominate, is that which lies west of the Rocky Mountains, and north of lat. 40°.

The present communication is confined to the central and western portions with their mountain chains and valleys, lying between the Rocky Mountains and the Pacific Ocean.

The view taken by many European geographers and naturalists, (and which originated with Humboldt), that all the great elevations of the American continent belong to that long chain which, under various denominations and with many interruptions, extends from the mouth of Mackenzie's River to Cape Horn, can with difficulty now be sustained.

For along the Pacific coast, from Vancouver's Island to the extremity of the peninsula of California, runs the coast range of mountains, whose direction is not parallel to, though determining, the coast line for so many hundred miles, and which neither topographically nor geologically have any resemblance to, or dependence upon, the Rocky Mountains. The coast mountains are a series of parallel ranges, sometimes as many as six, running N. 45° W., whose north-western edges form the promontories on the Pacific coast. The ranges are separated from each other by narrow valleys of great beauty and fertility, which form the most populous districts of California and the territories to the north. Having the same mineral constitution, and uplifted by the same force, they naturally form but one mountain chain, whose breadth varies from 30 to 80 miles, and whose general direction is under meridian 123° 30′ from Vancouver's Island to Cape Mendocino. From thence to its southern termination, its direction is south, 20° east. In latitude 34° 30′ it meets with the southern extremity of the Sierra Nevada, where the range culminates in the Coco-Mungo, San Bernardino and Temecula Hills.

To the east of this extensive, though low range of hills, few of whose summits reach 4,000 feet altitude, lie the Cascade Mountains and the Sierra Nevada, of which notice is given more in detail hereafter.

Both of these chains aid in running the coast line in a direction nearly north and south, and thus influence *solely* the form of the west side of this continent, as far south as lat. 30°. The form of both sides of the continent, south of parallel 30°, is due to the Rocky Mountain range, which extends south to the volcanic system of Mexico, which between parallels 18° and 20°, runs in a direction nearly east and west, elevating the mainland of Honduras and Yucatan on the east, and stretching out westward into the Pacific, and reappearing as the Revillagigedo Islands. Not any one of these ranges are subordinate to or dependent on the Rocky Mountains.

The central spine of the continent, the Rocky Mountains as they are inappropriately termed, extend from Mackenzie's river to the mouth of the Rio Grande, and should not be considered in any part of their course as a single chain, but as a series of parallel chains, including elevated valleys, and separated to some extent from each other by low swelling grounds, forming the important mountain passes.

The number of parallel chains increases as we pass south, until, in parallel 34° and 36°, where the Rocky Mountains are widest, as many as six distinct chains, running north and south, may be traced.

The result of so many ruptures of the crust within a space of 560 miles (between parallels 32° and 40°), must seriously affect the general level of the continent, and hence there is found a great plateau elevated many hundred feet above the regions lying north, which, the nearer they approach the polar circle, gradually drop down into the low land bordering the shore of the Northern Ocean. The Rocky Mountain range is found traversing both elevated and depressed portions of the continent, presenting, on the one hand, toward the north, mountains whose summits reach 12 to 14,000 feet high, yet whose base and valley adjoining does not exceed in altitude a few hundred feet. On the other hand, in lat. 33°, the valleys, for five hundred miles across the continent, have an elevation approaching five thousand feet, the hills themselves rarely exceeding 3,000 or 4,000 above their base.

In this lower latitude, the valleys are not slopes but level plains. To the eye looking across them, the country appears as if the depressions between these chains had been filled up evenly to the base of the hills, while as yet they were under water, and the fine sand sifted so as to give a floor perfectly even and smooth; and that it is not the whole mountain which we see, but merely the crest of the range, peeping up here and there, above the depths of an accumulated ancient alluvial deposit, and finally, that the successive ranges from east to west are so many crests protruding up from a common granite basis. The similarity presented by the physical appearance and the geological structure, would confirm the truth of this supposition.

This chain extends farther north than any other mountain range on the continent, for it does not wholly terminate at the mouth of Mackenzie's river, but stretches along shore in the same direction, which it usually held—north 20° west—forming lesser ranges which define the shore line of the Icy Sea, passing along Point Beechy until Point Barrow is reached near lon. 161°.

Between lat. 50° and 70° north, and from Mackenzie's river to the shores of Hudson's Bay, there is not an elevated mountain chain, nor any evidence of volcanic forces having been recently exerted within this area; yet there is in this limit a belt of granitic land extending from the mouth of the Coppermine river, in a south-easterly direction, to the shores of Lake Superior. If a line be drawn between these two points, it would define the eastern limit of the belt of primary rock, which forms hills not more than 500 or 600 feet above the level of the surrounding land, enclosing little valleys containing lakes in their depressions. It is eminently the lake country of the north, and so even is the country over several hundred miles, that the drainage does not run in any one direction, but follows that which a slight local irregularity might determine. Franklin in his first voyage north to the mouth of the Coppermine river, crossed this granite tract, and found it 200 miles wide. It includes in its course Great Bear Lake, Slave Lake, Athabasca, Woollaston and Deer lakes, Lake Winnipeg and the Lake of the Woods. Many large rivers, as the Saskatchawan, Beaver and Churchill rivers, cross this tract completely in their eastern course, forming here and there low, swampy flats. Granite, gneiss, mica-slate and amphibole rocks form the whole of this country, which no where attains a mountain elevation. West of this, the land gradually rises to the base of the Rocky Mountains, and to the east the slope is more gradual until the level of Hudson's Bay is reached. On the eastern slope silurian strata are formed. Vast deposits similar to those of middle New York, deposited almost horizontally, and so slightly elevated since deposition, that no fracture or disturbance of these ancient stratified rock has occurred. So slight is the slope of the deposit towards Hudson's Bay, that on reaching its shores, the shallows extend far into the bay, and vessels at anchor in five fathom water, are at such a distance from the land, that the cedar trees on the low shore are hardly discernible.

These silurian deposits have undergone little change of elevation since the period of their deposit, and this granitic belt must be looked on as among the first upheaves of the American continent; and that which determined the primitive shape of our continent, long anterior to the elevation of the Alleghanies, the Rocky Mountains, the Cascades, Sierra Nevada, or any of the minor ranges of the centre of the continent. The primal continent did not pass south of lat. 45° N., and the additions of land which have been made have been, in the first instance east of meridian 95°, and then west of that.

The next northern range influencing the form and climate of the continent is the Cascade range, which is a series of lofty mountains disposed in a single massy range containing both active and extinct volcanoes. The southern termination may be considered at Shasta Peak in California, while to the north it is prolonged through Oregon and Washington Territory into the British possessions, where north of lat. 62°, it meets the range which runs through Russian America into Alatska. This latter range is the representative of the coast range of mountains which are so well developed in California. In Oregon and Washington, the Cascades and the coast ranges appear to be blended to some extent, and not separated by the large interval of repose characterised as the Sacramento and Tulare Valleys at the western base of the Sierra Nevada.

To the east of the Cascade range, north of of lat. 50°, there are no ranges until the mouth of Mackenzie's river is reached, when the Rocky Mountains are encountered. The eastern side of the Cascade range is much more rugged and steep than the western, where the grade to the shore is interrupted by a series of lesser hills intervening. Throughout its whole course it runs in a direction almost due north and south, confining itself between meridians 121° and 123°, with a general elevation of 8,000 feet, attaining in a few points, from 15,000 to 16,000 feet.

The passes in the Cascades are few, and none of them very low. In places the whole has been dislocated by subterranean disturbances, as where the Columbia passes through to reach the shore, but few are less than 3,500 feet, or half the average height of the chain.

So continuous and decided a range as this must exert a marked influence upon the climate of the lands lying to its east. These are, in general, flat basaltic plains, covered with volcanic debris, and traversed by a few large rivers, but not watered by lakes or fed by small streams to any extent. The atmosphere is also remarkably healthy, clear and dry. On the western side everything is the reverse of this. Moist air, abundant rains and snows, with numerous and copious streams.

On the low lands and along the shores of the Pacific, until the mountain range is reached, the climate is mild. The isocheimenal line of 39° passes over Puget's Sound, and a mild winter, with many falls of rain, is the consequence. These rains become snows on the mountains, where they attain great depths during the repeated falls, unaccompanied by thaws.

Ascending the chain, the snows deepen, until, in the passes, a depth varying from 20 to 50 feet is met with. At these elevations the winter temperature is excessive. Once the season has set in, no further thaws occur; the moisture falls as snow entirely, which accumulates, and which, in some cases, the summer ensuing does not wholly melt. The summer itself is short and cold, and even August sometimes finds the thermometer at the freezing point in the morning, and one half inch of ice to have been formed at night.

From Puget's Sound, where the winter temperature is that of Charleston, S. C., along the coast southwards, the temperature gradually increases, until, at San Francisco, it amounts to 51° Fahr. The increase of warmth above that of the Atlantic coast in similar parallels is chiefly produced by the warm current of water which rolls southward from Bhering's Straits with its superincumbent current of warm air. This current becomes a north-west wind, which is always moist and warm, and is the cause of the large annual deposit of rain, amounting to more than 40 inches in Oregon, and near to 50 inches in Washington Territory. The rarifaction of the air upon the low shore valleys determines a current flowing off the sea toward the land. This increase of temperature is felt even up to Russian America, where the eastern shores of the Straits have a vegetation which might be considered inter-tropical, when contrasted with the Arctic vegetation of the Asiatic side of the Straits. The effect of this warm current of air does not extend east of the Cascade chain; nor any where along the Pacific coast does the influence of the ocean extend beyond the first lofty range of mountains.

The rain which falls annually on this coast diminishes rateably as we advance south; thus, 46 inches of rain at Steilacom, becomes 23 inches in lat. 40°, 15 inches in 37°, and 10 inches in 32°. Hence it is that the snows are so much deeper on the Cascades than in the Sierra Nevada; and hence, also, that south of 33° is a desert country east of the Cordilleras. From the shore inland the amount of rain-fall also diminishes, and its influence is well seen on the northern Sierra Nevada, where the pines are found growing only on the western summits and slopes; and when these are passed, cedars are found, and still farther east even the cedars disappear, to give way to artemesia, cactus, and thorny plants. Such is everywhere the character of vegetable growth, and the manner in which the absence of moisture is evidenced, as we advance eastward, after crossing the high ranges of mountains.

Where the Cascade mountains terminate at the south, the Sierra Nevada commences, and passes in a southerly direction until it terminates in lat. 34°, by merging into the coast range. In passing over 6 degrees of latitude, its exact course is south 15° east. Although running in a line nearly similar to that of the Cascades, this range must not be considered a continuation of the Cascades in a geological sense; for while the latter are a series of hills uplifted by direct volcanic action, and many of its mountains either active or extinct volcanoes, it cannot be said—with our present information—of the Sierra Nevada, that there is a single mountain in its chain which bears the evidence of having been a volcano. Cut through as the whole chain has been, especially on its western flanks, by erupted rocks as trap and basalt, yet none of these can be considered as axial or capable of elevating the mountain system, which may be rather regarded as being produced by accomodations of the crust to the internal pressure reacting upon it. The Sierra is a continuous chain of massy mountains, slightly overlapping each other at the termination of the links, where, in some instances, passes are formed. The mass is of great breadth, being 60 miles across at the base. Like the Cascades, the gentler slope is that lying east, while that on the west side is abrupt and generally through narrow gorges. Everywhere on its west side the Sierra Nevada stands upon a lofty range several thousand feet high, clad with snow on the summits for many months of the year. On the east and toward the south, or in lat. 36°, its altitude above the desert level is also very great; but as this basin is traversed northward, its elevation increases, so that in 40° lat. the crests of the range are not more than 500 or 600 feet above the valley of Humboldt river; in ascending from which to enter California, the Sierra constitutes a series of high plateaus or parks, with low hills forming their margins.

The Great Basin is not as its name implies, a trough cut deeply below the level of its boundaries on either side, but is rather a series of elevated steppes, each steppe made up of valleys of limited extent partially bounded by short chains of hills running north and south, round the extremities of which one valley opens into another. The hills are mostly below 2,000 feet high, a few attaining to 3,000 feet. Such are the Humboldt River Mountains. The plain over which this river runs is not a true valley, but a depression of the strata resembling a fault which determines the flow of the waters across the general strike of the mountains of the Basin. The river rises by two heads in the mountains of that name, and travels eastward about 300 miles, gradually diminishing as it rolls west, until it empties by a small stream into Mud Lake, at the eastern base of the Sierra. Formed wholly from the snow on the Humboldt Mountains, and not deriving waters from affluents in its downward course, it soon loses itself in the parched soil, resembling all the rivers of the Basin, which diminish as they flow onwards, until, under the influences of evaporation and absorption, they finally disappear. On account of the deficiency of moisture, there are no trees on the plains, and but a scanty supply on the solitary mountain ranges. Grass scanty and sparse, humble and thorny vegetation, with a sprinkling of composite plants, form the chief vegetation of the upper steppe of the Basin; while in the lower levels, as in the valley of Mojave river and the Colorado desert, owing to its less elevation and more southern latitude, the drought is greater; the valleys with grass and cottonwood only on the river bottom; the soil fertile where moist, but irredeemably barren where dry.

Three distinct levels may be defined in the Basin, which in its whole extent is 600 miles wide, and reaches from 32° to 42°, or 10 degrees, of a pear shape, with the stalk to the south, where the altitude does not exceed the sea level, while along the Humboldt river valley, the level approaches 4,000 feet. The variations of level of the basin are not separated by mountain chains, but by low, undulating swells of land, which serve as a divert to the waters descending from the mountains.

In the lower steppe, or the Colorado (basin) desert, it may be said almost never to rain; at least the rains are very few in the year—one shower in 8 montns of 1854 being all that was noticed by one living in a small cabin on the east side of the Sierra Nevada. The desert has an arid and sterile appearance, a few mesquit trees, cactus, artemisia and kindred plants are the vegetation. For miles together there is not a blade of grass. Alternately a sandy bottom or a bed of fine clay, and finally drift sands, until the Colorado river is reached. It is noteworthy of this river, that it does not flow in the centre of the valley, or at its lowest level, but at the side; carrying down a great amount of mud and debris in its large volume of water which occasionally overflows its banks.

The temperature of this desert is very great, amounting in June (1855) to 122° Fahr., at 2 o'clock, P.M., and 127° on one occasion, at 3 P.M., commencing at sunrise with 96° Fahr. Such temperatures must completely exhaust a soil of its surface water. Even the running streams, at the foot of the Sierra, under such warmth gradually dry up, and are lost before midday, leaving a channel as their only indication until evening sets in, when the waters gradually re-appear, and by night time the stream regains its original volume.

Nor is this dry and barren condition peculiar to the region immediately east of the Sierra Nevada. It extends as far eastward as the Rocky Mountains, and generally speaking up to longitude 96°: the whole interior of the continent for 21 degrees in the northern part of the United States, and for 17 degrees in the southern, is deprived of a due fall of rain, and most of that which falls does not descend at the time when it could be serviceable to vegetation. Even the central plains and vallies between the various chains embraced under the deviding ridges of New Mexico are merely able to support a scanty supply of tough grass, which can only support a limited number of cattle. In the river bottoms of New Mexico are the only seats of the population, and these are limited in extent.

Between 36° and 42° N. lat. lies the most elevated portion of the continent. For although the Rocky Mountains do not attain so great a height as farther north, yet they are spread out more laterally, forming several mountain ranges, with high plains lying between. Indeed, between these parallels is an immense elevated mass of country, having the Sierra San Juan, De la Plata, Elk Mountains, the Park and Black Mountains, Santa Fe and Sandia Mountains on the east side, and on the west side Mogollon, Wabash, Uinta, Bear and Wind River Mountains. These mountains are but the erupted crests of a vast uplift of country, whose general elevation ranges from 4,000 to 7,000 feet on the plains. The Wabash Mountains form the western crest, beyond which the country drops down to the lower levels of the basin.

The great elevation of the continent within the limits indicated, results in bringing the sources of the largest rivers into juxta-position. Thus, in lat. 55°, the carboniferous strata of the Rocky Mountains attain a height of 16,000 feet, and in this neighborhood three of the largest rivers head—the Saskatchawan, Columbia, and Mackenzie's rivers; and, according to a high authority, three of them from the same hill; Mackenzie's and the Columbia being only two hundred yards apart, and the Columbia and the Saskatchawan not more than 14 paces asunder. About lat. 43° the sources of Snake and Green rivers are not many miles apart. The sources of the Yampai and Platte rivers are divided by a single ridge of mountain; and an affluent of Grand river, and the north fork of the Platte river, are found in the same valley; so that in lat. 40° and 42° the waters roll north-west into the Pacific, south-west into the Gulf of California, east to the Mississippi Valley and south to the Gulf of Mexico.

The mountains forming the east edge of this lofty plateau have a direction varying slightly from the meridian. In parallel 46°, the Black Mountains lie under longitude 104°. In parallel 31° they pass under the same meridian, their general trend is north and south; for small distances it is north, 12° west. The western ranges, as the Wabash, Pinal-llano and Mogollon Mountains are more north-west and south-east, and hence they tend southward to merge into the other, and both together coalescing, form the narrow upland of Mexico. It is this last series of mountains which is continuous with the Rocky Mountains of the British possessions, the eastern ranges terminating in the Black Hills, which lie south of the Missouri river, where it turns eastward.

The configuration which Mexico now presents—a peninsular plateau running north-west and south-east, of great elevation and abruptness on its western face, and dropping to the sea level at the east by well defined plains of lesser altitude—was that which the whole North American continent possessed during the latter Secondary and earlier Tertiary periods; then a wide sea separated the Apalachian hills from the highlands of the central chain, and reached from the Gulf of Mexico to Hudson's Bay, while a scarcely less extensive belt of water reached from the Bitter Root Mountains to the Gulf of California.

Could a geographer have examined our continent at that period, he would not have failed to have observed what is not yet acknowledged to the extent which it deserves, namely: that the plateau of this continent, between parallels 30° and 44°, is as well defined as that of Mexico, and is continuous with it. The numerous chains of the Rocky Mountains constitute or involve this plateau; and since the number of parallel chains northward is great, the width of the plateau corresponds, while to the south, (Mexico), the plateau is made up solely of the western chains, the eastern ones having terminated in Texas and at the Gulf of Mexico. The limits of the plateau to the north are the Park Mountains and Black Hills, around which the Yellowstone and Missouri sweep from their source in the Wind River Mountains. These latter, constituting the north-western edge of the plateau, connect it with the Bitter Root Mountains farther north; thence to the Arctic Ocean, no plateau has been observed. The Rocky Mountains, depressed in latitude 46° and 48°, rise again as lofty hills in 60°; and thence their altitude gradually falls to 2,000 feet, until they reach the Polar regions.

The prairie lands terminate near Peace river, and north of Great Slave Lake no flat country skirting the base of the Rocky Mountains has been observed. A single chain of hills represent the series above lat. 62°.

The following list enumerates the chains which form the eastern and western margin of the central plateau:

Lat.	On the West.	On the East.
48°—45°	Bitter Root M'tains..	Rocky M'tns (proper.)
45°—43°	Salmon River "	Snow " Big Horn Mountains.
43°—38°	Wahsatch.	
34° 50'—33°	Mogollon......	Black Hills. Park Mountains.
33°—32°	Sierra Catanna...	Sierra Blanca. Guadalupe.
31°—	Santa Cruz.	

The eastern chains pass east of the Rio Grande, and do not form any portion of the elevated plateau of Mexico; while those chains lying west of that river enter Sonora and Chihuahua, and become the Sierra Madre of that country.

In thus tracing the central plateau with its ridges superimposed, and its relations to the other meridional and more western systems, the remarkable fact presents itself, that nowhere west of 100° long. (Greenwich) is there a chain of mountains whose axis and direction is from east to west. All the forces which have elevated mountains over that large portion of our continent have been exerted so as to produce meridional elevations; and all connections between the central plateau and the Cascade Mountains, or the Sierra Nevada, are by the intervention of a series of lesser chains, whose trend is north and south. Such are the Humboldt River Mountains, and all those found on the Great Basin, even to the head of the Gulf of California. The parallelism of the upheaving forces exerted on the western half of this continent is very remarkable.

The points which are deemed of importance to be noticed, are:

1. The direction of the great plateau-spine or ridge of the continent, which, in lat. 50°, lies west of long. 114°, in lat. 43°, has extended east to 110°. In lat. 37° its eastern limit is 105°, and in lat. 30°, 104°—its course north of 40° being in the north-west direction, but south of 40° it is almost meridional. These are its eastern limits; the western ones are in parallel 50°, long. 118°—in parallel 40°, long. 112°—the same in 37° lat., and in 32°, 110°—and thence in a south-easterly course into Mexico. It may be perceived that the greatest width of the parallel chains is in lat. 37°, or 36° where it measures 8° across, narrowing to 4° in the British possessions, and to nearly 6° when it enters Mexico. Where its width is greatest, its altitude also is greatest. Owing to its altitude the winter temperatures are severe, and the summers deficient in a supply of rain, either not sufficient in quantity, or not falling at the favorable season, to support grass or herbage; hence, the interior of the continent is a desert everywhere, except in the narrow bottoms of the larger rivers. This spine, which, in the centre of the United States, consists of a central elevated mass of land supporting as many as six ranges of mountains from west to east, is depressed toward the north, and supports only two, and is also depressed toward the south, where there is not one continuous range, but a series of short chains, with level plains between and surrounding them.

2. That the extension of the continent westward is due to a second spine of lesser importance than the Rocky Mountains, extending from Russian America into Lower California. This spine, lofty in the north, and containing many volcanic mountains, considerably modifies the climate of the country lying to the east, by depriving it of its due supply of moisture, rendering the whole country, called the Great Basin, almost perfectly sterile.

3. The moisture and rain-fall of the country lying between these two chains, is derived, in the north, from the surplus moisture of the winds from the Pacific which have already deposited most of their vapor on the Cascade Mountains in the form of snow, averaging a depth of thirty feet thick, and in some passes, as at Yakima, even fifty feet deep. The moisture of the south of the Basin desert is, on the

contrary, derived from the south-east winds coming from the Mexican Gulf, but which are also drained by passing over the elevated plains 4,000 feet high, and the eastern mountain chains along the Rio Grande, and thus have but little residual moisture to deposit; hence the whole of this district, from north to south, suffers from deficient supply of rain, and is to be classed with the uncultivable land at the eastern base of the Rocky Mountains. Hence, for all practical purposes of agriculture and civilization, this continent, from long. 100° to the base of the Cascades and Sierra Nevada, is unfitted for the support of man, except in some favored valleys, or at the base of the mountain chains.

THE COLORADO EXPEDITION.

THE COLORADO OF THE WEST AND THE COUNTRY BORDERING IT—THE GRAND CANON.

During the past year a careful examination of the lower Colorado, for the purpose of ascertaining its capabilities for navigation by steamboats, was made by Lieut. Ives, of the United States Topographical Corps. As everything connected with the region described in his Report of the expedition, possesses great interest, both in a scientific and commercial point of view, and as the report contains valuable information never before made public, a portion of it is herewith inserted. The steamer used by the exploring party was a small iron vessel, constructed at the mouth of the river. The ascent was commenced on the 31st December, and is thus described by Lieut. Ives:

I continued up the river for five hundred miles, reaching, on the 11th of March, in lat. 36° 6′, the mouth of a stream supposed to be Rio Virgen, beyond which it was impracticable to proceed in boats. I therefore sent back the steamboat and the hydrographic party to Fort Yuma, and taking advantage of the permission granted in the instructions from the Department, left the river on the 23d of March, with a pack train, to examine, as far as possible, the country through which the Upper Colorado and its tributaries flow.

Keeping as near as possible to the river, I traversed the region along the 36th parallel, the greater portion of which had been previously unexplored. Most of the line of the 35th parallel was also visited. Following various lines of examination, gradually conducting towards the east, I arrived, about the 1st of June, at Albuquerque, on the Rio Grande—the distance accomplished during the land explorations amounting to nearly nine hundred miles. At Albuquerque the expedition was broken up—a few members of the party still retained—returning home by the overland route to Fort Leavenworth.

During the progress of my work upon the navigable portion of the Colorado, the water happened to be, according to the evidence of those who had lived in that vicinity for many years, unprecedently low. An opportunity was thus afforded of trying the experiment of steam navigation at the worst stage of the river, and at a time when the difficulties ordinarily to be encountered would be considerably magnified.

The region at the mouth of the Colorado is a flat expanse of mud. The lines of the shore and the channels that afford entrances to vessels from the Gulf, are shifting and changeable, and bars, shoals, and islands, composed of a semi-fluid mass, are in constant progress of formation and removal. The navigation for thirty miles above is rendered periodically dangerous by the strength and magnitude of the Spring tides. They have a rise and fall of from 25 to 30 feet, and a flow of extraordinary velocity. The flood is preceded by a "bore" or huge tide-wave, from four to seven feet high. In certain narrow bends it is very powerful and violent, but gradually loses its force as it ascends, and at a distance of thirty miles is scarcely perceptible. Along wider portions of the river are curves of the shore in which its force is not felt, and here boats may be safely moored till this dangerous wave has rolled by. Upon the shoals are formed what are called "tide-rips," where the sudden check given to the rushing volume of water causes it to bound along in high successive waves. Steamboats that come to the mouth of the river during the spring tides must ascend above tide-water during the ebb, and start to return two or three hours after the commencement of the flood.

The neap tides have a rise and fall of only ten feet, and a moderate velocity.

Between tide-water and Fort Yuma, the principal obstructions to navigation are the sand bars. These become more frequent and difficult as the river is ascended. The channel is exceedingly circuitous and continually changing.